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Docket No. 50726

METAL ALLOY COMPOSITIONS

AND PLATING METHODS RELATED THERETO

This application is a divisional of application number 09/895,470 filed on June 29, 2001, now U.S. Patent No. 6,706,418. The nonprovisional application designated above, namely application 09/895,470, filed June 29, 2001, claims the benefit of U.S. Provisional Application 60/215,668, filed July 1, 2000.

1. Field of the Invention

This invention relates generally to the field of metal alloys useful for metal plating a wide variety of articles, including printed circuit boards and other electronic packaging devices. In particular, the invention relates to additives and their use as a grain refiner in tin and tin alloy plating formulations. Furthermore, the present invention relates to additives which improve the stability of metal plating solutions, particularly copper-based systems.

10 2. Background

For many years, tin-lead alloy electroplating has been the process of choice in applications requiring attachment of electronic components to printed wiring boards by soldering or reflowing. Such tin-lead alloys have been used as solders and solderable finishes on components. The temperature at which the solder melts is highly important.

15 For tin-lead alloys the temperature of 183° C (eutectic Sn-Pb) matches very well the currently used materials for electronic parts. Much higher melting temperatures may result in deformations of the printed wiring board laminate, whereas distinctly reduced liquidus temperatures may lead to unwanted melting of the solder joint during other thermal operations of the assembly process.

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Due to its toxic properties lead will likely be banned in electronic parts in the near future. Many tin-lead alternatives have been suggested, including pure tin, tin-silver, tin-copper, and tin-bismuth.